IEEE802.11g *Wireless PCI Card*

WL-8310

User Manual

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio technician for help.

FCC Caution

To assure continued compliance. (example-use only shielded interface cables when connecting to computer or peripheral devices). Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate

the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the Following two conditions: (1) This device may not cause harmful interference, and (2) this Device must accept any interference received, including interference that may cause undesired operation.

Federal Communication Commission (FCC) Radiation Exposure Statement

This equipment complies with FCC radiation exposure set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20 cm(8 inches) during normal operation.

R&TTE Compliance Statement

This equipment complies with all the requirements of DIRECTIVE 1999/5/CE OF THE EUROPEAN PARLIAMENT AND THE COUNCIL OF 9 March 1999 on radio equipment and telecommunication terminal Equipment and the mutual recognition of their conformity (R&TTE)

The R&TTE Directive repeals and replaces in the directive 98/13/EEC (Telecommunications Terminal Equipment and Satellite Earth Station Equipment) As of April 8,2000.

Safety

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this and of the computer manufacture must therefore be allowed at all times to ensure the safe use of the equipment.

EU Countries Not Intended for Use

The ETSI version of this device is intended for home and office use in Austria Belgium, Denmark, Finland, France (with Frequency channel restrictions). Germany, Greece, Ireland, Italy, Luxembourg .The Netherlands, Portugal, Spain, Sweden and United Kingdom.

The ETSI version of this device is also authorized for use in EFTA member states Iceland, Liechtenstein, Norway and Switzerland.

Potential restrictive use

France: Only channels 10,11,12 and 13

Revision

User’s Manual for PLANET IEEE802.11g Wireless PCI Card

Model: WL-8310

Rev: 2.0 (July, 2003)

Part No. EM-WL8310V2

Manual Contents

Chapter 1 Introduction 1

1.1 Features....1

1.2 Applications....1

1.3 Specification....4

1.4 Package Contents....4

1.5 Minimum System Requirements....5

1.6 SAFETY PRECAUTION....5

1.7 Installation Considerations....5

Chapter 2 Installation Procedure 6

2.1 Configuration Utility Installation....6

2.2 Windows 98/ME/2000/XP/Server 2003 Driver Installation....8

Chapter 3 Configuration Utility 11

3.1 Link Info....12

3.2 Configuration....13

3.3 Advanced....14

3.4 Site Survey....16

3.5 About....16

Appendix 18

Chapter 1 Introduction

IEEE 802.11g uses 2.4GHz unlicensed ISM band, the same as IEEE 802.11b; but it provides almost 5 times data rate than traditional 802.11b products. WL-8310 is compliant to both 802.11b and 802.11g, but it is capable to offer much higher data rate than standard. With the latest innovative Super G technology integrated, the maximum data rate of WL-8310 is 108Mbps, which doubles the speed of standard 802.11g. Thus makes WL-8310 more suitable for multimedia applications which required more bandwidth.

The WL-8310 is provided with a detachable dipole antenna that can be replaced with optional external antennas to obtain better signal quality and greater connection distances.

The WL-8310 supports both 64/128-bit WEP (Wired Equivalent Privacy) and Wi-Fi Protected Access (WPA) for securing wireless network connections. The driver and utility supports most popular operating systems: Windows 98SE/ME/2000/XP/Server 2003. With advanced features and high performance capability, the WL-8310 is an excellent choice for constructing a wide range of wireless solutions.

1.1 Features

- Wireless LAN IEEE 802.11g and 802.11b standards fully compliant
- Wireless connection without the difficulty and cost of cabling
- Super G mode provides up to 108Mbps data rate
- Based on 2.4GHz Direct Sequence Spread Spectrum (DSSS) Technology
- Supports 64/128-bit WEP (Wired Equivalent Privacy) and Wi-Fi Protected Access (WPA)
- Supports Ad-Hoc (Peer to Peer) communication and Infrastructure mode with Access Point
- Seamless integration with IEEE 802.3 LAN through any IEEE 802.11b or 802.11g compliant Access Point
- Supports most popular operating systems including Windows 98/Me/2000/XP/Server 2003
- One detachable dipole antenna
- Low Interference and High Susceptibility Guarantee Reliable Performance
- Supports Power Save mode
- Supports PCI standard v2.2

1.2 Applications

1.2.1 Infrastructure

The WL-8310 provides access to a wired LAN for wireless workstations. An integrated

wireless and wired LAN is called an Infrastructure configuration. A group of WL-8310 PC users and an Access Point compose a Basic Service Set (BSS). Each WL-8310 PC in a BSS can talk to any computer in the wired LAN infrastructure via the Access Point.

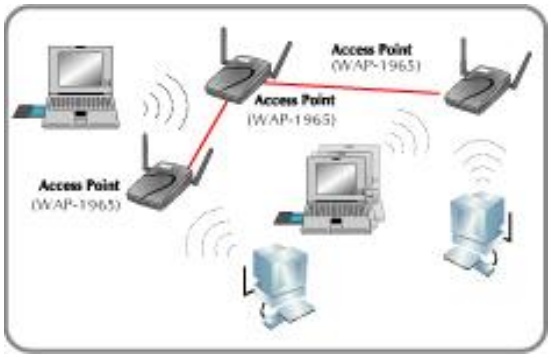
An Infrastructure configuration extends the accessibility of a WL-8310 equipped PC to a wired LAN, and doubles the effective wireless transmission range for 2 WL-8310 PCs. Since the Access Point is able to forward data within its BSS, the effective transmission range in an infrastructure LAN is doubled.

The use of a unique ID in a BSS is essential. All WL-8310 equipped PCs configured without roaming options in an independent BSS must be configured with a BSS ID corresponding to the WL-8310 used in the BSS. Check your WL-8310 for its BSS ID or use the Site Survey function on Configuration Utility program to determine the BSS ID.

The Infrastructure Wireless LAN configuration is appropriate for enterprise-scale wireless access to a central database, or as a wireless application for mobile users.

Infrastructure mode also supports roaming capabilities for mobile users. More than one BSS can be configured as an Extended Service Set (ESS). The continuous network allows users to roam freely within an ESS. All WL-8310 PCs or other IEEE 802.11b and 802.11g compliant wireless adapters within one ESS must be configured with the same ESS ID and use the same radio channel.

Before enabling an ESS with roaming capability, choosing a feasible radio channel and optimum Access Point position is recommended. Proper Access Point positioning combined with a clear radio signal will greatly enhance performance.



1.2.2 Ad-Hoc

An Ad-Hoc wireless LAN is a group of computers, each equipped with one WL-8310 adapter or other wireless adapters, connected as an independent wireless LAN. Computers in a specific Ad-Hoc wireless LAN must be configured to share the same radio channel.

Ad-Hoc wireless LAN configurations are appropriate for branch level departments or SOHO operations.

1.2.3 General Application

WL-8310 offers a fast, reliable, cost-effective solution for wireless client access to the network in applications like these:

1. Remote access to corporate network information

E-mail, file transfer and terminal emulation.

2. Difficult-to-wire environments

Historical or old buildings, asbestos installations, and open area where wiring is difficult to employ.

3. Frequently changing environments

Retailers, manufacturers and banks who frequently rearrange the workplace and change location.

4. Temporary LANs for special projects or peak time

Trade shows, exhibitions and construction sites need temporary setup for a short time period. Retailers, airline and shipping companies need additional workstations for a peak period. Auditors require workgroups at customer sites.

5. Access to database for mobile workers

Doctors, nurses, retailers, white-collar workers need access to database while being mobile in the hospital, retail store or office campus.

6. SOHO (Small Office and Home Office) users

SOHO users need easy and quick installation of a small computer network.

7. High security connection

The wireless security network installs quickly and provides the flexibility to reconfigure easily.

1.3 Specification

Product	IEEE802.11g Wireless PCI Card
Model Name	WL-8310
Attachment Interface	PCI V2.2
LED Indicators	Steady for power on; blink for WLAN link/act
Operating Frequency / Channel	2.412~2.462GHz (FCC, USA & Canada) / 11 Channels 2.412~2.4835GHz (TELEC, Japan) / 14 Channels 2.412~2.472GHz (ETSI, Europe) / 13 Channels
RF Modulation	Direct Sequence Spread Spectrum (DSSS) Technology (OFDM, CCK, QPSK, BPSK)
RF Output Power	16dBm (typical)
Sensitivity	802.11g: -72dBm @ PER<8%, 54 Mbps 802.11b: -82dBm @ PER<8%, 11 Mbps
Data Rate	802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps with auto-rate fall back 802.11b: 11, 5.5, 2, 1 Mbps with auto-rate fall back
Media Access Protocol	CSMA/CA + ACK
Antenna	One detachable dipole antenna
Working Mode	Ad-Hoc, Infrastructure
Power	3.3 / 5 Volt
Dimension (mm)	133 x 121 x 22 mm
Humidity	0-95%, non-condensing (Operating and storage)
Temperature	0 – 55 degree C (Operating), -10~70 degree C (Storage)
Compatibility	Windows 98SE/ME/2000/XP/Server 2003
Management	Utility or Windows XP built-in management interface
Electromagnetic Compatibility	FCC Part 15 class B, CE Mark, ETS 300 328

1.4 Package Contents

Before installation, please check the items of your package. The package should include the following items:

WL-8310	x 1
Dipole Antenna	x 1
Quick Installation Guide	x 1
Drivers and User's Manual CD	x 1

If any of the above items are missing, contact your supplier as soon as possible.

1.5 Minimum System Requirements

Before installation, please check the following requirements with your equipment.

- Operating System: Windows 98/Me/2000/XP/Server 2003
- Desktop PC with CD-ROM driver
- One vacant PCI slot

1.6 SAFETY PRECAUTION

Only use the accessories attached with the device package. Otherwise, the device may not function. If you miss or damage the accessories, please contact your local dealer.

1.7 Installation Considerations

- Please keep the number of walls and ceilings between the Access Point and clients as less as possible. Each wall or ceiling can reduce your wireless cover range form 3-90 feet. Position your Access points, Residential Gateways, and computers so that the number of walls or ceilings is minimized.
- Building materials make a difference – A solid metal door or aluminum studs may have a negative effect on range. Try to position Access Points, and computers with wireless adapters so that the signal passes through drywall or open doorways and not other materials.
- Keep the wireless product away form electrical devices or appliances at least 3-6 foot, which may generate extreme RF noise.

Chapter 2 Installation Procedure

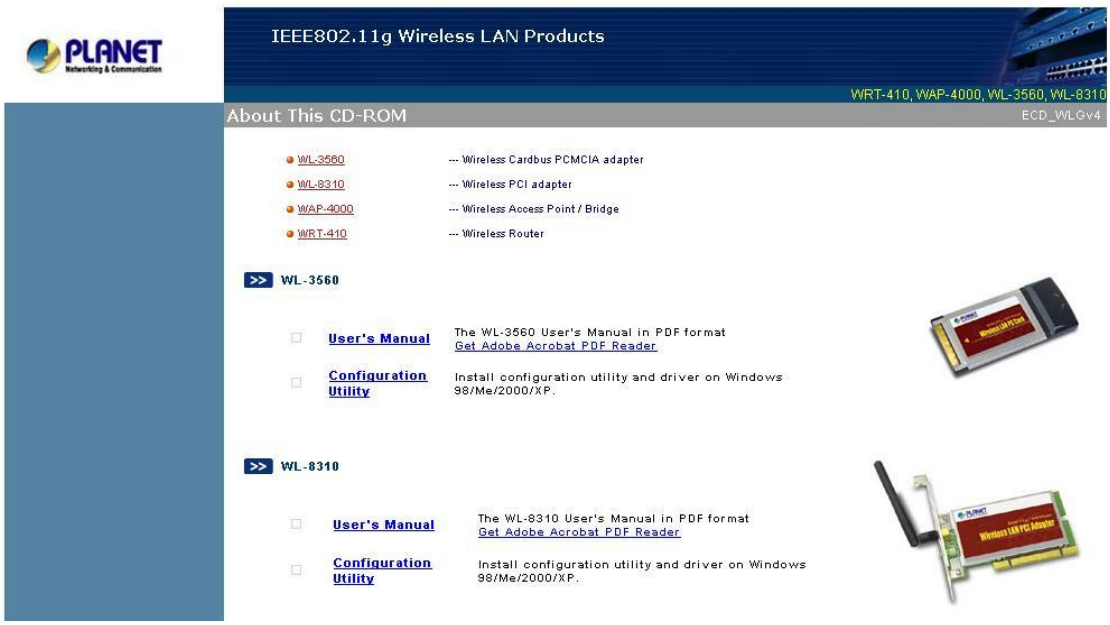
Before you proceed with the installation, it is necessary that you have enough information about the *Wireless PCI Card.* Use the Procedure described below to install the card under Windows 98/Me/2000/XP/Server 2003.

Note: If you ever install the other Wireless Card before, please uninstall the existed driver and utility first. If this is the first time to install this device, please refer to the following steps to complete the installation.

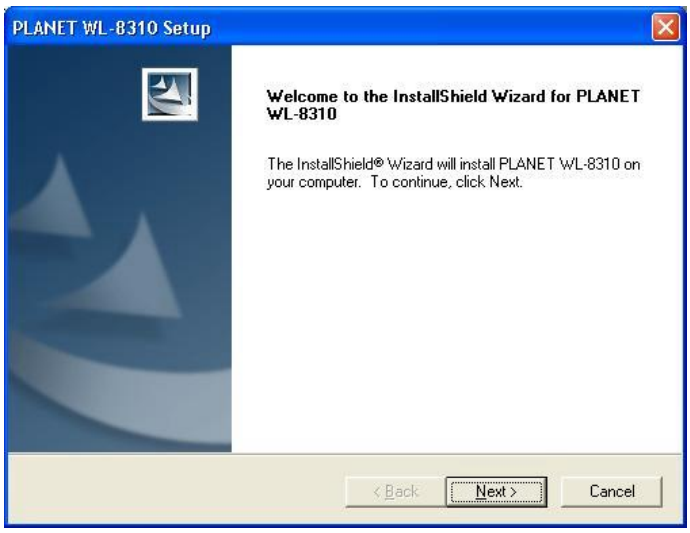
2.1 Configuration Utility Installation

Please install the configuration utility before insert WL-8310 into the PCI slot of the computer.

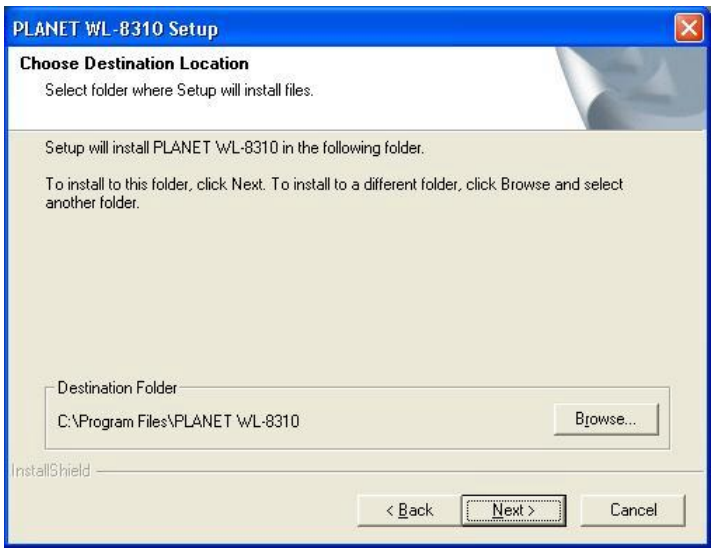
1. Insert the CD-ROM into the CD-ROM drive to initiate the autorun program. Once completed a menu screen will appear as follows.


PLANET
IEEE802.11g Wireless LAN Products
WRT-410, WAP-4000, WL-3560, WL-8310
About This CD-ROM
ECD_WLGv4
WL-3560 --- Wireless Cardbus PCMCIA adapter
WL-8310 --- Wireless PCI adapter
WAP-4000 --- Wireless Access Point / Bridge
WRT-410 --- Wireless Router
>> WL-3560
User's Manual
The WL-3560 User's Manual in PDF format
Get Adobe Acrobat PDF Reader
Configuration Utility
Install configuration utility and driver on Windows 98/Me/2000/XP.
>> WL-8310
User's Manual
The WL-8310 User's Manual in PDF format
Get Adobe Acrobat PDF Reader
Configuration Utility
Install configuration utility and driver on Windows 98/Me/2000/XP.

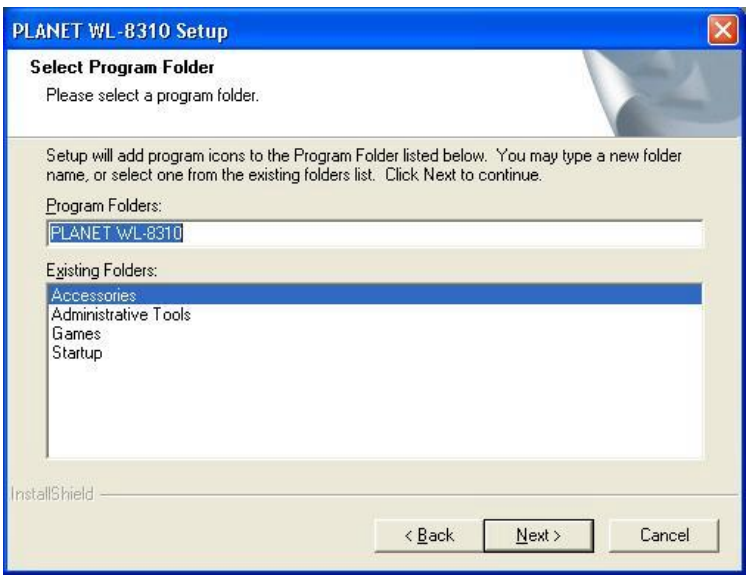
2. Click on “Configuration Utility” hyper link in WL-8310 field to initiate the installation. If the above screen is not shown, you can click the “Start” button and choose “Run”. When the box appears, enter “E:\Utility\WL-8310\setup.exe” (Suppose “E” is your CD-ROM drive). You will see the dialog box as the picture. Please click “Next” to continue.


PLANET WL-8310 Setup
Welcome to the InstallShield Wizard for PLANET WL-8310
The InstallShield® Wizard will install PLANET WL-8310 on your computer. To continue, click Next.
< Back
Next >
Cancel

3. You can click “Browse” to specify the Destination Folder that you want to install the configuration utility. Or you can keep the default setting and click ”Next” to continue.


PLANET WL-8310 Setup
Choose Destination Location
Select folder where Setup will install files.
Setup will install PLANET WL-8310 in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\PLANET WL-8310
Browse...
InstallShield
< Back
Next >
Cancel

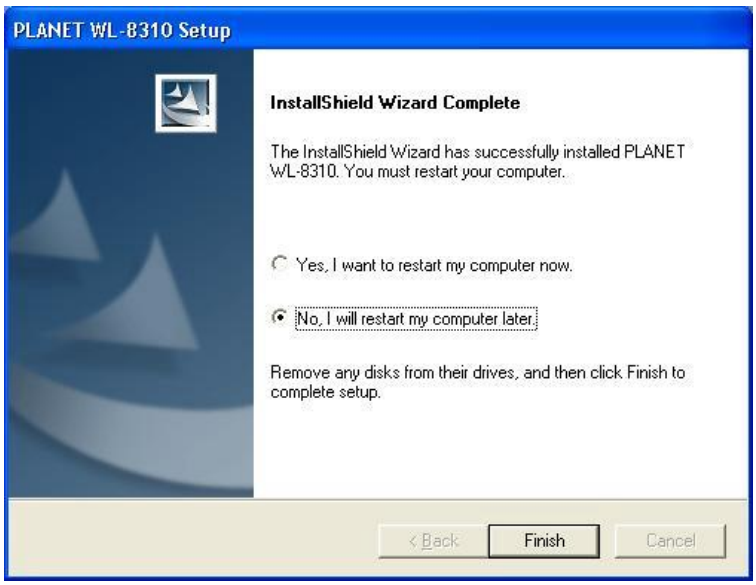
4. Select the program folder you want to install this utility to. Or you can keep the default setting and click ”Next” to continue.


PLANET WL-8310 Setup
Select Program Folder
Please select a program folder.
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing folders list. Click Next to continue.
Program Folders:
PLANET WL-8310
Existing Folders:
Accessories
Administrative Tools
Games
Startup
InstallShield
< Back
Next >
Cancel

5. Click “Finish” to complete the installation procedures.

PLANET WL-8310 Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed PLANET WL-8310. Click Finish to exit the wizard.
< Back
Finish
Cancel

6. The system will prompt you to restart the computer now or later. Select desired option, then click “Finish”.


PLANET WL-8310 Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed PLANET WL-8310. You must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
< Back
Finish
Cancel

2.2 Windows 98/ME/2000/XP/Server 2003 Driver Installation

Note: The following installation operates under Windows XP. Procedures will be similar to other operating system.

1. Power off the computer. Insert WL-8310 to a vacant PCI slot and turn on the computer.

2. The “Found New Hardware Wizard” screen will appear. Please select “Install the software automatically (Recommended)” option, and click “Next” to continue.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install software for:
PLANET WL-8310
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

3. The system will search for the proper driver. Then a dialog box will pop up as below. Click “Continue Anyway” to continue.

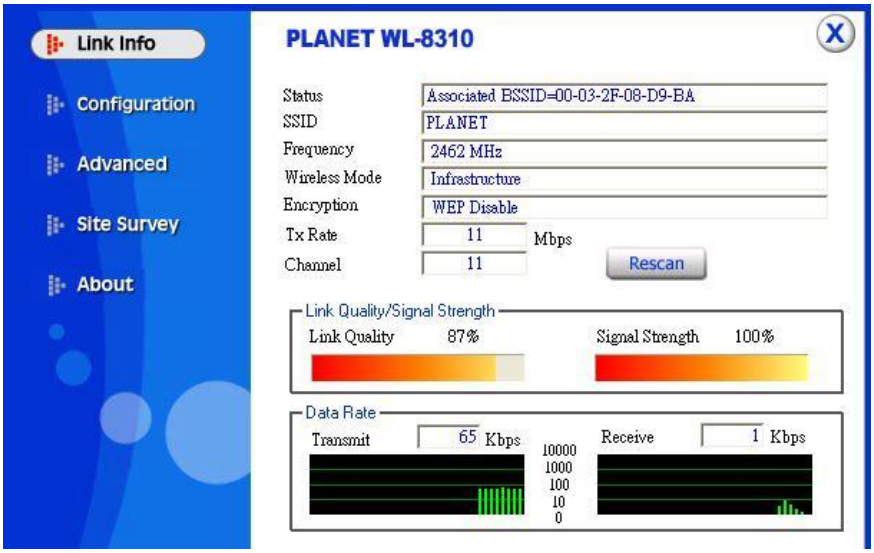
Hardware Installation
The software you are installing for this hardware:
PLANET WL-8310
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

4. Click “Finish” to complete the installation.

Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
PLANET WL-8310
Click Finish to close the wizard.
< Back
Finish
Cancel

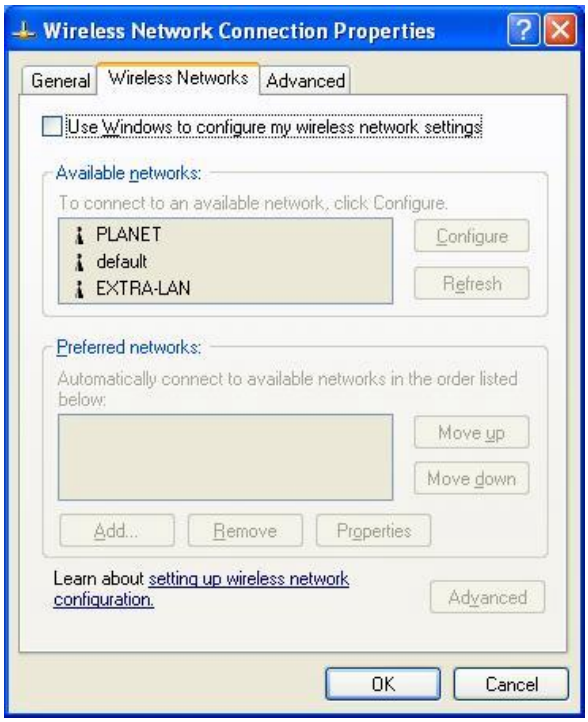
Chapter 3 Configuration Utility

The Configuration Utility is a powerful application that helps you to configure the WL-8310 and monitor the status of the communication process. By double click the icon on the system tray, the dialog box as below appears.



This utility can be used to modify the configuration parameters when the device is active. Following details the configuration options.

Note: It is recommended to use PLANET utility to configure WL-8310, even under windows XP system. Thus, please disable the “Wireless Zero Configuration Service” in windows XP before activating PLANET utility. To disable the service, you can go to the “Properties” screen of the wireless network, and clear the box of “Use Windows to configure my wireless network settings” as illustrated below.



3.1 Link Info

This screen contains current link information of WL-8310.

Status: Shows the BSSID associated with, which can be used to identify the wireless network.

SSID: Shows current SSID, which must be the same for the wireless client and AP in order to establish the communication.

Frequency: Shows the current frequency used for wireless network.

Wireless Mode: Shows the current wireless mode used for wireless communication.

Encryption: Shows the current encryption mode used for wireless network.

TxRate: Shows the current data rate used for transmitting.

Channel: Shows the current channel for communication.

Link Quality: Shows the link quality of WL-8310 with the Access Point when operating in Infrastructure mode.

Signal Strength: Shows the wireless signal strength of the connection between the WL-8310 and the Access Point.

Data Rate: Shows the statistics of data transfer, and the calculation is based on the number of packets transmitted and received.

3.2 Configuration

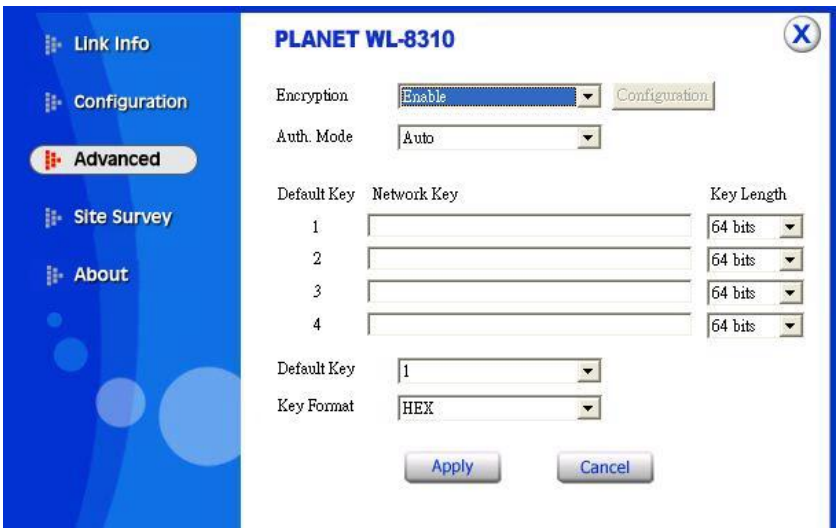
In this screen, you can configure the wireless settings of WL-8310. After configuration, please press ”Apply” to save settings or “Cancel” to set again.

- **SSID:** The SSID must be identical for each clients and nodes in the wireless network.
- **Wireless Mode:** Click pull-down button and select the work mode below.
  - **Ad-Hoc:** This mode indicates the peer-to-peer operation. All communication is done from client to client without the use of an Access Point.
  - **Infrastructure:** This operation mode requires the presence of an Access Point. All communication is done via the Access Point.
- **AdHoc Band:** There are two bands available for selection
  - **11B:** Allows user to set the 802.11b standard wireless network.
  - **11G:** Allows user to set the 802.11g standard wireless network.
- **Channel:** Shows the number of the radio channel used for the networking.
- **Tx Rate (11B/G):** Shows the Data Transfer Rate. If Auto Mode is selected, the device will choose the best transfer rate automatically.
- **Tx Rate (11A):** Preserved for future usage.
- **Power Mode:** Shows Power Management modes. There are two optional selections for this mode.
  - **Continuous Access Mode:** WL-8310 will always set in active mode.
  - **Maximum Power Save:** WL-8310 will enter power saving mode when it is idle.
  - **Power Save:** WL-8310 consumes the moderate level of power.
- **Preamble:** There is two options can be selected: Short & Long Preamble, Long Preamble. Preamble is a sequence of bits transmitted at 1Mbps that allows the PHY circuitry to reach steady-state demodulation and synchronization of bit clock and frame start. Two different preambles and headers are defined: the mandatory supported Long Preamble and header, which interoperate with the 1 Mbit/s and 2 Mbit/s DSSS specification (as described in IEEE 802.11), and an optional Short Preamble and header

(as described in IEEE 802.11b). At the receiver, the Preamble and header are processed to aid in demodulation and delivery of the PSDU. The Short Preamble and header may be used to minimize overhead and, thus, maximize the network data throughput. However, the Short Preamble is supported only from the IEEE 802.11b (High-Rate) standard and not from the original IEEE 802.11. That means that stations using Short-Preamble cannot communicate with stations implementing the original version of the protocol.

- **Support Band:** The supported bands of WL-8310 are 11B, 11G, and 11G Turbo (11A and 11A Turbo are preserved for future usage). With all options selected, WL-8310 can keep the highest flexibility when making connection to AP. If you fix the WLAN band for both AP and WL-8310, it can skip the initial negotiation time.

3.3 Advanced



Additional security can be achieved by using any of the following encryption methods: WEP (Wired Equivalent Privacy), WPA (Wi-Fi Protected Access), and WPA-PSK (Pre Shared Key).

When "Enable" is selected in "Encryption" field, WEP encryption is activated. Please enter the appropriate parameters to these fields.

- **Auth. Mode:**
  - **Auto:** With this setting, stations can communicate with the Access Point either with or without data encryption. It will detect the AP that it connected is using which Authentication mode and use the same mode to communicate.
  - **Open Authentication:** With this setting, the station in the WLAN can receives and transmits data from Access Point (null authentication).
  - **Shared Authentication:** With this setting, allows communication only with other devices with identical WEP settings.
- **WEP Key options:**
  - **Default Key:** There are 4 keys available for the WEP function. Please select one of

them for WEP to operate.

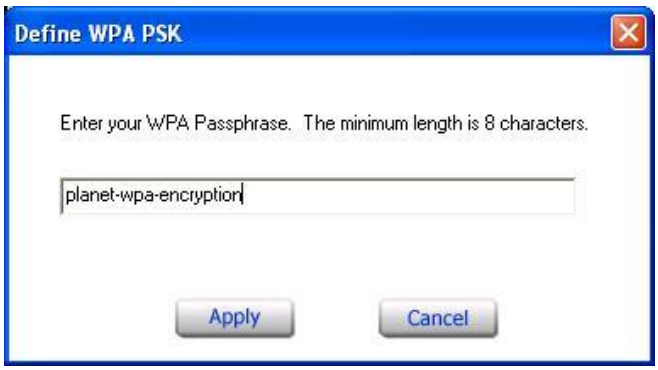
- Ø **Network Key:** You can define the WEP (Wired Equivalent Privacy) Key values by yourself.
- Ø **Key Length –** Please select which WEP key mode you want to use. There are three modes, each mode has two kind of key length and that is decide on the **Key Format** you selected. 64bit (5ASCII / 10HEX.), 128bit (13ASCII / 26HEX).

u **Key Format –** You can select WEP key format to **HEX** (Hexadecimal code, 0-9, A-F) or **ASCII** (American Standard Code for Information Interchange, 0-9, a-z, A-Z).

When "WPA" is selected in "Encryption" field, please click "Configuration" button for advanced settings.

WPA uses 802.1x and Extensible Authentication Protocol (EAP) as the basis of its authentication mechanism. Thus your computer needs to install a certification for the RADIUS server first. Please consult with your network administrator for getting the certification and the appropriate parameters of the above screen.

When "WPA-PSK" is selected in "Encryption" field, please click "Configuration" button and key in the identical passphrase as configured in Access Point.



WPA-PSK is a special mode of WPA for home users without an enterprise authentication server and provides the same strong encryption protection.

3.4 Site Survey

This screen shows the APs or Adapters which available fro WL-8310 to connect. If you configure the SSID of WL-8310 as “Any”, it will show all available APs and Adapters at the same time.

Click **“ Refresh “** to collect the BSSID and Channel information of all the wireless devices around you.

If you wish to connect to any device on the “**Available Network**” list, select the device on the list and click “**Connect**”, then WL-8310 will connect to the selected device and create a profile for the selected device automatically.

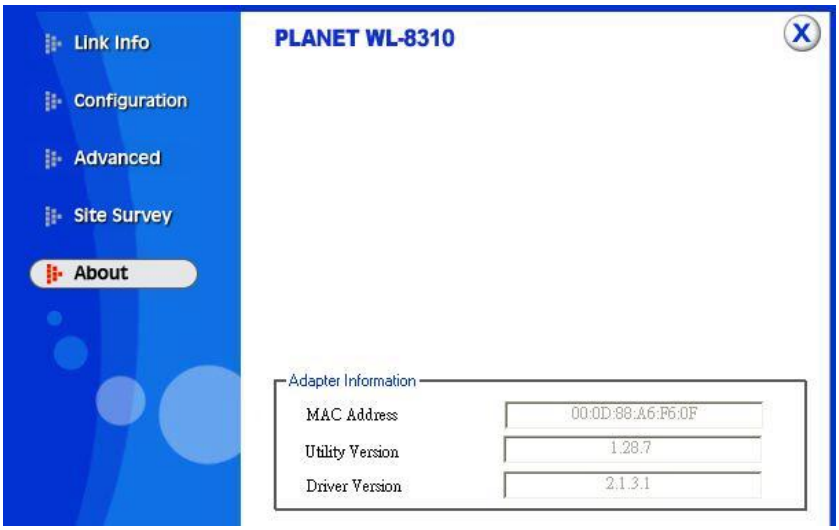
You can configure profile with those buttons:

- **Add:** Add a new profile.
- **Remove:** Delete the profile you selected.
- **Properties:** Modify the profile you selected.

After press **Add** or **Properties**, the dialog box will appears for configuring profile. You can refer to above to know how to configure the setting for your need.

3.5 About

It shows the current ***Driver***, ***Firmware*** and ***Utility*** version.


Link Info
Configuration
Advanced
Site Survey
About
PLANET WL-8310
Adapter Information
MAC Address
00:0D:88:A6:F6:0F
Utility Version
1.28.7
Driver Version
2.1.3.1

Appendix

This section provides some technology Q&A. Read the description below to know more about the wireless network.

- **What is the difference between 54Mbps and 11Mbps wireless products? What's the benefit of 54Mbps Wireless Access Point?**

  The 54Mbps is made possible by the new modulation method called OFDM, which is different from the current CCK modulation method for 11Mbps. The 54Mbps wireless products also operate in the 2.4GHz ISM band and they are backward compatible with 11Mbps wireless products.

- **What is ISM band?**

  The FCC and their counterparts outside of the U.S. have set aside bandwidth for unlicensed use in the ISM (Industrial, Scientific and Medical) band. The 2.4GHz unlicensed ISM band is available worldwide, which presents the opportunity for the global market of 802.11b and 802.11g high speed wireless products.

- **What is Ad-Hoc?**

  An Ad-Hoc integrated wireless LAN is a group of computers, each with a WLAN adapter, Connected as an independent wireless LAN. Ad-Hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.

- **What is Infrastructure?**

  An integrated wireless and wired LAN is called an Infrastructure configuration. Infrastructure is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.

- **What is BSS ID?**

  A specific Ad-Hoc LAN is called a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSS ID.

- **What is Roaming?**

  Roaming is the ability of portable computers, e.g., Packet PC and notebook, to have consistent and continuous data transmission/reception throughout an area covered by more than one Wireless Access Point. In order to achieve seamless connectivity, all the wireless clients and Access Points must be set to use the same SSID. When a user walked out of the coverage area of one AP into another, the wireless client network device will automatically reestablish connection with the new AP.

- **What is a MAC Address?**

  The Media Access Control (MAC) address is a unique number assigned by the manufacturer to any Ethernet networking devices, e.g. a network adapter, that allows the network to identify it at the hardware level. Unlike IP addresses, which can be

changed or dynamically assigned by the network, the MAC address of a networking device is permanent.

- **What is WEP?**

  Wired Equivalent Privacy (WEP) is a type of data encryption mechanism described in the IEEE 802.11 standard.

- **What is WPA (Wi-Fi Protected Access)?**

  WPA resolves the issue of weak WEP headers, which are called initialization vectors (IV), and provides a way of insuring the integrity of the messages passed through MIC (called Michael or message integrity check) using TKIP (the Temporal Key Integrity Protocol) to enhance data encryption. WPA-PSK is a special mode of WPA for home users without an enterprise authentication server and provides the same strong encryption protection. WPA is not an official IEEE standard, but is based on and is expected to be compatible with the upcoming 802.11i security standard.

- **Could I implement the driver/utility installations on another operating system, e.g. Windows 98SE, 2000 and ME? Are there any differences of driver/utility installations among these different operating systems?**

  Yes, you can. All the installation mentioned in this user's manual could be implemented on Windows 98SE/ME/200/XP and there will be no difference.

- **Can Wireless products support printer sharing?**

  Wireless products perform the same function as LAN products. Therefore, Wireless products can work with Netware, Windows NT/2000/XP, or other LAN operating systems to support printer or file sharing.

- **What is DSSS？What is FHSS？And what are their differences?**

  Frequency-hopping-spread-spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern that is known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be short-duration impulse noise. Direct-sequence spread-spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without-the need for retransmission. To an unintended receiver, DSSS appears as low power wideband noise and is rejected (ignored) by most narrowband receivers.

- **What is Spread Spectrum?**

  Spread Spectrum technology is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communication systems. It is designed to trade off bandwidth efficiency for reliability, integrity, and security. In other

words, more bandwidth is consumed than in the case of narrowband transmission, but the trade off produces a signal that is, in effect, louder and thus easier to detect, provided that the receiver knows the parameters of the spread-spectrum signal being broadcast. If a receiver is not tuned to the right frequency, a spread –spectrum signal looks like background noise. There are two main alternatives, Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).

- **How does WL-8310 reach the high data rate, 108Mbps?**

  WL-8310 is using Atheros AR5002G chipset which enhanced with Super G mode. There are three technologies used in Super G mode. First is called **Packet Bursting**, which puts more data in one single transmission. Second technology is called **Compression.** The AR5002G chipset employs a special engine to compress and encrypt data. The last technology is **Combine Channel,** which combines two radio channels simultaneously for one connection. Through the above three technologies, Super G mode can provide up to 108Mbps data rate, but the available channels will be reduced to 6 only.